Quantifying the environmental sustainability of stormwater management systems

Brudler, Sarah; Arnbjerg-Nielsen, Karsten; Hauschild, Michael Zwicky; Ammitsøe, Christian ; Hénonin, Justine; Rygaard, Martin

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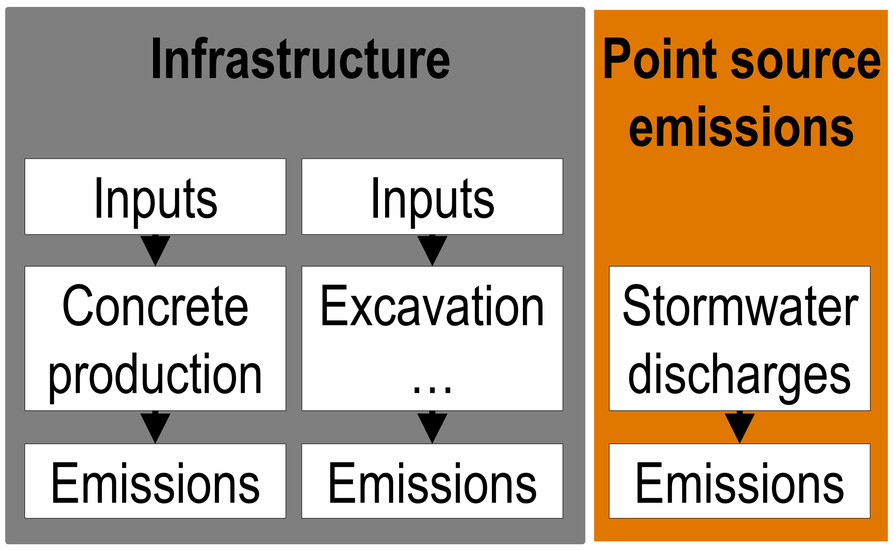
Quantifier la durabilité environnementale des systèmes de gestion des eaux pluviales



Introduction

Stormwater management systems require inputs (materials, energy) and cause emissions through

- construction, operation and decommissioning of the physical **infrastructure** and
- **point source emissions** of polluted stormwater,

leading to environmental damage.

Methods and materials

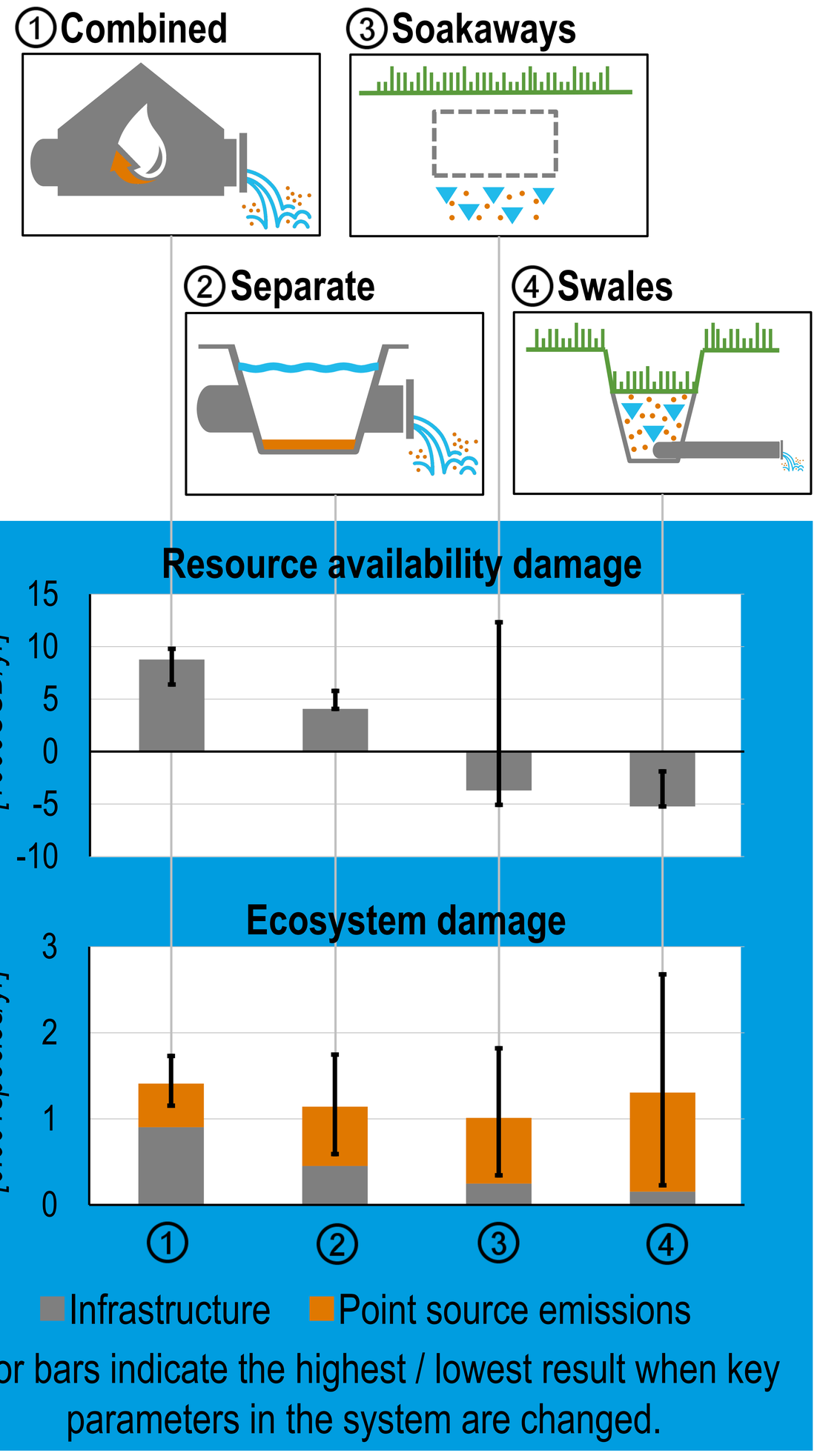
We used **life cycle assessment** to quantify the environmental damage caused by **four different stormwater management systems** dimensioned for a residential catchment of 260ha in Odense, Denmark.

The assessment is based on a **comprehensive inventory** of all processes required over the life cycle of the different systems.

Results

The subsurface combined and separate systems cause high **resource availability damage,** mainly caused by **material demands** for pipes and basins. The green infrastructure based systems (soakaways and swales) even avoid damage because of **avoided road renewal** where swales and curb extensions are installed.

All systems cause similar **ecosystem damage**, which is mainly caused by discharges of **polluted stormwater**. Changes regarding the assumed decommissioning processes and removal efficiencies affect the results significantly, highlighting the **potential to optimize** the sustainability in the planning process.



Error bars indicate the highest / lowest result when key parameters in the system are changed.

Sarah Brudler, Karsten Arnbjerg-Nielsen, Michael Z. Hauschild, Christian Ammitsøe, Justine Hénonin, Martin Rygaard

VCS Denmark

DTU